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PLANT IMMIGRANTS.

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Foreign Seed and Plant Introduction.

EXPLANATORY NOTE.

This multigraphed circular is largely made up from notes received from agricultural explorers, foreign correspondents, cooperators, and others, relative to the more important plants which have recently been received by the Office of Foreign Seed and Plant Introduction of the Department of Agriculture; in it are also contained accounts of the behavior in America of plants previously introduced. Descriptions appearing here are revised and published later in the Inventory of Seeds and Plants Imported.

Applications from experimenters for plants or seeds described in these pages may be made to this Office at any time. As they are received the requests are placed on file and when the material is ready for the use of experimenters it is sent to those who seem best situated and best prepared to care for it. The plants or seeds here described (except such as are distributed direct or are turned over to specialists in the Department who are working on investigational problems) are propagated at our Plant Introduction Field Stations; and when ready to be distributed are listed in our annual check lists, copies of which are sent to experimenters in the late fall. It is not necessary, however, to await the receipt of these lists should one desire to apply for plants which are described herein.

One of the main objects of the Office of Foreign Seed and Plant Introduction is to secure material for plant breeders and experimenters. Every effort will be made to fill specific requests for experimental quantities of new or rare foreign seeds or plants.

David Fairchild.
Agricultural Explorer in Charge

*Office of Foreign Seed and Plant Introduction,
Bureau of Plant Industry,
U. S. Department of Agriculture.*

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Achimenes sp. (Gesneriaceae), 51195. From Chama, Alta Verapaz, Guatemala. Seeds presented by Mr. Harry Johnson. "No. 436. A fine gesneriad with sky-blue flowers, about 1 inch in diameter and with white and yellow throats, borne in terminal racemes of from 3 to 22. The plant produces small round scaly tubers, and should make a good basket plant." (Johnson.)

Citrus sinensis (Rutaceae), 51215. **Orange.** From Jerusalem, Palestine. Budwood presented by Mr. J. Ettinger, director, Agriculture and Colonization Department, Zionist Commission. "Budsticks of the Jaffa orange, 'Shamooti.'" (Ettinger.)

The Jaffa orange is one of the largest, larger even than the Washington Navel. Its seedless fruit is obovate, with a very thick skin. The tree is not spiny, and the fruit, therefore, is never scarred by thorns. Its shipping qualities are excellent. The Jaffa oranges seen in Tunis and Algeria and those grown in America and illustrated in American publications have very little resemblance to the real Jaffa orange. They are represented as having seeds, while the true Jaffa orange is seedless. (Adapted from Aaronsohn, Agricultural and Botanical Explorations in Palestine, p. 26.)

Cordia sp. (Boraginaceae), 51101. From Santiago de las Vegas, Cuba. Seeds presented by Mr. Gonzalo M. Fortun, director, Agricultural Experiment Station. "A plant generally known in Cuba as 'vomitel'; it is also called 'gutaperi.' The fruits of this plant are edible, and we were told that an excellent preserve is made from them. The tree, when loaded with its glorious heads of orange, crimped, salver-shaped flowers, makes a magnificent appearance." (Fortun.)

Dammara alba (Pinaceae), 51129. From Buitenzorg, Java. Seeds presented by Dr. I. Boldingh, acting head, Division of Plant Breeding, Java Department of Agriculture. A splendid tree, up to 100 feet high, of great importance on account of its yield of the transparent dammar resin, extensively used for varnish. Its stem is 8 feet in diameter, straight and branchless for two-thirds its length. Native to the Indian Archipelago and mainland, and extending to the Philippine Islands. (Adapted from Mueller, Select Extra-Tropical Plants, p. 161.)

Gundelia tournefortii (Asteraceae), 51142. From Jerusalem, Palestine. Seeds presented by Mr. J. Ettinger, director, Agriculture and Colonization Department, Zionist Commission. "Accoub de Syrie." A spiny composite from Persia with buttonlike flower buds about the size of a large strawberry, which when boiled and served with butter make an extremely satisfactory dish. This delicious vegetable is said to be the equal of asparagus and more delicate in flavor than artichokes. The plant is perennial, requires four years to attain maximum production, and is as long lived, perhaps, as asparagus. (Adapted from Bulletin de la Société National d'Acclimatation de France, vol. 34, p. 450.)

Inula royleana (Asteraceae), 51037. From Kashmir, India. Seeds presented by Mr. Charles Hadow, British Embassy, Washington, D. C. "The 'Tunla' or 'Galmey sunflower,' collected at an altitude of 8,000 feet in Kashmir, India, on grassy slopes exposed to snow in winter." (Hadow.)

A very attractive sunflowerlike composite from the western Himalayas. The very stout stem is usually not more than a foot high, occasionally 18 inches, with yellowish-green, thick-veined, finely serrate leaves and very broad thick bracts. The flowers are usually solitary, and are of a brilliant orange color, with crenate ray flowers. (Adapted from Flora and Sylva, vol. 1, p. 310.)

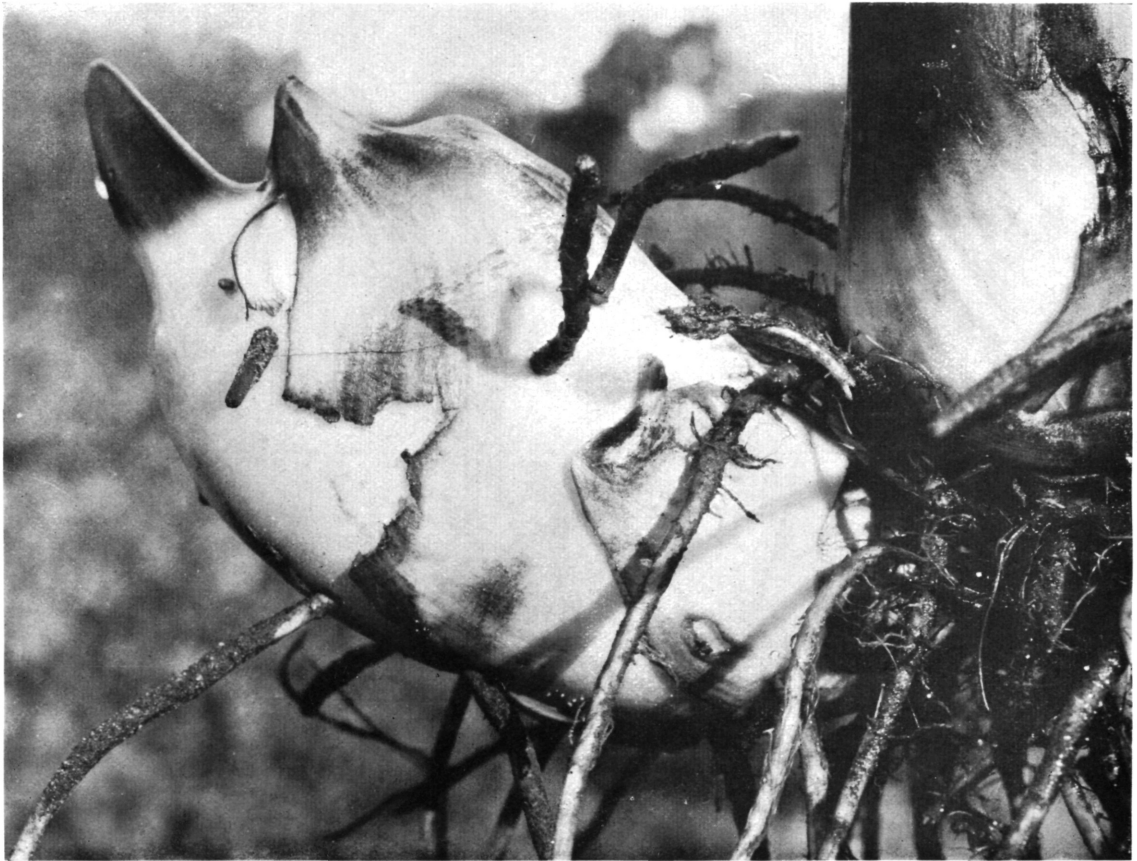
Madhuca indica (Sapotaceae), 51155. **Mowra tree.** From Allahabad, India. Seeds presented by Mr. William Bembower, Allahabad Agricultural Institute. One of the most useful plants found in the plains and forests of the East Indies; the tree yields food, wine, and oil. It is 40 to 50 feet high with a short trunk and numerous spreading branches forming a close, shady, rounded crown. It thrives on dry and stony ground in all parts of central India and is protected by the natives. The part eaten is the succulent corolla which is rich in sugar and is highly valued as a foodstuff, and as the source of a spiritous liquor. Some conception of the value put upon the flowers is gained from an estimate made some years ago, that in the Central Provinces over 1,000,000 people use these corollas as a regular article of food, each person consuming about 80 pounds per annum; throughout India the corollas are looked upon as a valuable



YOUNG PLANT OF EDIBLE CANNA.

(*Canna edulis* Ker. See S. P. I. No. 46313.)

Although attempts to grow the Bermuda arrowroot (*Maranta arundinacea*) were made many years ago in Florida, with more or less success, the edible canna or Queensland arrowroot appears not to have been tried there. In Queensland this species, related to the ordinary flowering canna, which has escaped from cultivation and grows wild in the Everglades, is preferred because of the large yields—15 to 30 hundredweight of starch per acre. The stems and leaves are used for forage. (Photographed by David Fairchild, at the Plant Introduction Field Station, Brooksville, Fla., November 19, 1918; P24619FS.)



TUBER OF THE EDIBLE CANNA.

(*Canna edulis* Ker. See S. P. I. No. 46313.)

This tuber, with its brilliant white skin and crimson tip, is one of the most surprising things to dig up. It is almost as attractive and striking in appearance as a peach. Cooked, it is a palatable vegetable, somewhat resembling the turnip. As a producer of arrowroot, it has been cultivated for many years in Australia, where its heavy yields and ease of cultivation have made it more profitable than the Bermuda arrowroot (*Maranta arundinacea*). Tuber grown from seed planted July 17, 1918, at the Plant Introduction Field Station, Brooksville, Fla.; (photographed by David Fairchild, November 19, 1918; P24620FS. Natural size.)

reserve in famine years. The **mowra tree** sheds its leaves in February and the flowers appear in March and April, at which time the ground beneath the trees is carefully cleared.

The flowers have a thick, juicy, globe-shaped corolla of a pale cream color, inclosed at the base in a velvety, chocolate-colored calyx. The corollas fall in the early morning, and are collected by the women and children. They are then spread out to dry on mats in the sun when they wither to half their weight and develop a brownish red color. In some cases the flowers are collected before they drop, and in many places it is the practice to remove only the corollas, leaving the pistil to ripen to a fruit. A tree will yield 200 to 300 pounds of flowers in a year.

When fresh the flowers are extremely sweet, with a peculiarly pungent flavor and a characteristic color. When dry this flavor is less perceptible, particularly if the stamens are removed, -the flavor then resembles that of figs. The flowers are eaten either fresh or dried, and cooked in many different ways, -with rice, shredded coconut, or flour. The greater portion of the crop of flowers is used for the preparation, by fermentation, of mohwa spirit. The corollas are very useful for feeding cattle; they have extraordinary keeping qualities as they dry well and are not attacked by weevils. The composition of the flowers has been investigated at different times and the results vary considerably, particularly in respect to the quantity and nature of the sugar present. The total amount of sugar recorded in the flowers of this tree varies from 40 to 70 per cent. The quantity of cane sugar varies from 3 to 17 per cent and that of invert sugar from 40 to 53 per cent, while one author has stated that the sugar is entirely invert sugar. Only a small quantity of protein is present, the maximum amount recorded being 7.25 per cent.

The nuts contain a solid fleshy kernel, which includes from 35 to 40 per cent of a greenish-colored grease which is obtained by pressure. The oil cake has a bitter taste and can not be used for feeding cattle. The oil becomes rancid soon after manufacture and assumes a dirty yellow color. Its density at 15° C. is 0.972; it melts at 43° to 44° C. and solidifies at 36°. It is very soluble in ether and particularly so in alcohol. It saponifies easily with alkalies, and it constitutes a mixture of 80 per cent

stearin and 20 per cent olein, with crystals of stearic acid. This oil is used to adulterate clarified butter, and for soap and candle-making.

During the war, interest was centered in the production of acetone from these flowers to supply the local demand in connection with munition manufacture. The acetone was produced by the now well-known special fermentation process, and it has been alleged that the yield from the flowers was one-tenth of their weight, or nearly ten times as much as is obtainable by distilling wood. The demand for acetone in India in peace times would not be large enough to justify the available supplies of flowers being entirely devoted to the manufacture of that product, but there remains the possibility of their being used for the manufacture of industrial alcohol. The yield of alcohol from the flowers is high compared with that from potatoes and other materials commonly used. It has been stated that about 90 gallons of 95 per cent alcohol are obtainable from 1 ton of dried flowers.

In view of the extended use that is now being made of alcohol for power purposes, it seems likely that the most profitable way of utilizing the flowers would be as a source of a mixed motor spirit of the "natalite" type for local use in India. That motor spirit can be produced on a manufacturing scale in India from Madhuca flowers has already been demonstrated, and it is stated that running trials with this spirit proved satisfactory.

The tree is well adapted to withstand drought and is especially suited for planting on dry and waste lands where little else will grow. The tree takes about 20 years to produce flowers and seeds in large quantity, but during this period the land need not be entirely unproductive if interplanting were adopted at first. (Adapted from Daily Commerce Reports, Nos. 152 and 200, pp. 1235 and 952 respectively.)

Malus sylvestris (Malaceae), 51166. **Apple.** From Avondale, Auckland, New Zealand. Budwood presented by Mr. H. R. Wright, Avondale Nursery. "'Alpha,' aphid-resistant seedling from 'Irish peach.' The fruit is twice as large as the parent and much earlier. I consider it the earliest apple in existence. It is a goldmine to the fruit grower on account of its size, flavor, and extreme earliness; it is aphid proof and very productive. I predict a great demand for this apple as soon as I put it on the market, and when

largely planted here, I think it will give the consignments of Canadian apples which arrive here in early summer a good bump." (Wright.)

The parent, Irish Peach, is described as: "A medium-sized oblong fruit with clear yellow skin handsomely striped with bright red. The yellowish-white flesh is tender and very juicy; the tree is a regular cropper and aphid proof."

Manihot esculenta (Euphorbiaceae), 51126. **Cassava.** From Haiku, Maui Co., Hawaii. Cuttings presented by Mr. F. G. Krauss, superintendent of agricultural extension, Hawaii Agricultural Experiment Station, through Mr. J. M. Westgate, agronomist in charge, Honolulu. "'Wiebke cassava.' A very superior variety from the Island of Kauai, selected from volunteer seedlings by a man named Wiebke in whose honor the variety has been named. Not only does it yield better than the three long-established varieties, but it also remains tender, or at least does not become woody as do most of our varieties if left growing several months after maturity.

"Wiebke cassava promises to be superior to any of the above-mentioned varieties for culinary, feeding, and starch-manufacturing purposes. Harvested June 15, at the end of a 15-month growing period, at the Haiku substation, it yielded 17,776 pounds of clean roots per acre. This result was obtained on rough pineapple land, without fertilization and with little or no cultivation, aside from the initial plowing. The object was to test the rotation crop.

"In an 18-month growing period, completed in August, 1920, on soil fertilized with 500 pounds of phosphates (half super and half reverted), the Wiebke cassava yielded 19,111 pounds of roots per acre; on soil fertilized with 1,000 pounds of phosphates (half super and half reverted) it yielded 22,211 pounds. The starch recovered was 20 per cent." (Krauss.)

Ottophora fruticosa (Sapindaceae), 51106. From Lamac, Bataan, Philippine Islands. Seeds presented by Mr. P. J. Wester, agricultural advisor, Lamac Horticultural Station. "'Balinaunau.' A small tree with dark red to black, fleshy fruits about one-third the size of grapes, in racemes of 200 fruits. The flesh is sweet and edible but rather insipid. The roasted seeds taste like chestnuts. The tree, which grows at Lamac and may succeed in Florida, is quite ornamental in the fruiting season." (Wester.)

Phaseolus vulgaris (Fabaceae), 51198. **Common bean.** From Santiago, Chile. Seeds presented by Sr. Salvador Izquierdo. S. The Chilean bean, as this most interesting variety is called, is a climber with whitish flowers, and pods which become purple at maturity, each pod contains 5 to 7 almost globular, chamois-colored seeds. The foliage is equally abundant at flowering and fruiting time. During rainy periods this plant matures with no signs of mold or rot. The seeds are sown May 19, and are harvested the last part of September. When green, this variety makes an excellent dish; the ripe seeds are especially good in meat stews and soups. The seed is very starchy, it cooks well without splitting, and the seed coat is much more digestible than that of the Soissons bean and of similar varieties. (Adapted from Bulletin de la Société Nationale d'Acclimatation de France, vol. 65, p. 350.)

Syzygium cumini (Myrtaceae), 51100. **Jambolan.** From Lamac, Bataan, Philippine Islands. Seeds presented by Mr. P. J. Wester, agricultural advisor, Lamac Horticultural Station. "Seeds of the 'duhat,' one of our most popular small fruits." (Wester.)

A tropical Asiatic tree, 8 to 15 m. high, with ovate, coriaceous, shining leaves, and numerous yellow flowers crowded in terminal or axillary panicles, followed by loose clusters of 2 to 7 dark purple or black, smooth, shining, ovoid fruits, 25 mm. long, with rather large clingstone seeds. The thin skin adheres to the sweet, juicy, pleasant pulp which is white tinged with purple; the texture somewhat resembles that of the cherry. The sugar content is 12.20 per cent; the protein 0.80 per cent; and the acidity (as malic acid) 87 per cent. The fruit may be eaten out of hand with relish, and it makes an excellent jelly. In India it is sometimes made into wine. It is probably of prehistoric introduction into the Philippines and is common throughout the archipelago. (Adapted from Philippine Agricultural Review, vol. 10, p. 13.)

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